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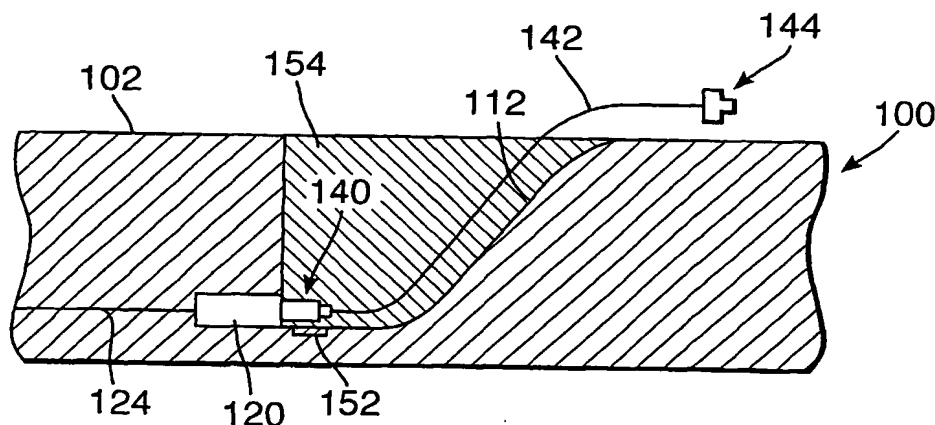
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[Continued on next page]

(54) Title: EMBEDDED FIBRE OPTIC CONNECTOR AND METHOD OF ITS INTERFACING WITH A SURFACE CONNECTOR



(57) Abstract: One aspect of the invention provides a method for providing a connection between an embedded fibre optic (124) and a surface connector (144). The method comprises providing a substrate (100) comprising an embedded fibre connector component (120), forming a trench (110) to expose the embedded fibre connector component (120), and forming a fibre abutment connection between the embedded fibre connector component (120) and a fibre optic (142). The fibre optic (142) is suitable for guiding radiation between the embedded fibre connector component (120) and the surface connector (144).



FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,
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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB2004/00537 6

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G02B6/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/136498 A1 (FOOTE PETER DAVID ET AL) 26 September 2002 (2002-09-26)	1-9, 12-17, 19-28, 30-38
Y	abstract paragraphs [0001], [0003], [0004], [0006] - [0012] paragraphs [0015] - [0024], [0028] paragraphs [0035] - [0039], [0050], [0051] paragraphs [0053], [0057] - [0059], [0064] - [0068], [0077] figures 1B-C, 2a-b, 3A-B ----- -/--	10, 11, 18, 29

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

17 March 2005

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB2004/005376

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 09, 4 September 2002 (2002-09-04) - & JP 2002 156093 A (SUMITOMO FORESTRY CO LTD), 31 May 2002 (2002-05-31)	13,24
Y	abstract paragraphs [0016], [0031] - [0035] figures 1,3,4	10,18,29
X	----- US 5 568 582 A (RAJIC SLOBODAN ET AL) 22 October 1996 (1996-10-22)	24
Y	abstract column 2, line 39 - column 3, last paragraph figures 1-3	11
X	----- WO 03/098301 A (QINETIQ LTD ;BURNETT JAMES GORDON (GB); LLOYD PETER ARTHUR (GB)) 27 November 2003 (2003-11-27)	24
A	abstract page 4, line 15 - page 5, line 25 figures 1-4	1-23, 25-38
A	----- US 5 355 429 A (LEE NICHOLAS A ET AL) 11 October 1994 (1994-10-11)	1-38
	abstract column 5, line 1 - column 7, paragraph 2 figures 5,6,10,11	
A	----- Z.J. LU AND F.A. BLAHA: "Application issues of fiber optic sensors in aircraft structures" September 1991 (1991-09), PROCEEDINGS SPIE VOL. 1588, PP. 276-281 , XP008030419 page 276, last paragraph - page 277, paragraph 2 figures 1-3	1-38

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2004/005376

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 39-54
because they relate to subject matter not required to be searched by this Authority, namely:
Connector component of incompletely searched independent claim 38 has been defined without any technical features as merely suitable for providing a fibre abutment connection.
2. ☒ Claims Nos.: 46-54
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-38

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Connector component of incompletely searched independent claim 38 has been defined without any technical features as merely suitable for providing a fibre abutment connection.

Continuation of Box II.2

Claims Nos.: 46-54

The subject-matter of non-searched claims 46-54 is defined merely by references to the accompanying drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-38

Method and device relating to the substrate comprising an embedded fibre connector component and an embedded fibre optic.

1.1. claims: 1-37

Method and device relating to the substrate comprising an embedded fibre connector component and an embedded fibre optic optically connected to the embedded fibre connector component, the connector component being suitable for forming a fibre abutment connection with a second fibre optic.

1.2. claim: 38

a connector component suitable for providing a fibre abutment connection between a second fibre optic and an embedded connector component.

2. claims: 39-45

Automatically operable machine system suitable for exposing the fibre connector component embedded in a substrate and related program instruction code.

INTERNATIONAL SEARCH REPORT

Internati plication No
PCT/GB2004/005376

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2002136498	A1	26-09-2002	AU 777128 B2	07-10-2004
			AU 2530901 A	24-07-2001
			EP 1247124 A2	09-10-2002
			EP 1353206 A2	15-10-2003
			WO 0151974 A2	19-07-2001
			JP 2003519822 T	24-06-2003
JP 2002156093	A	31-05-2002	NONE	
US 5568582	A	22-10-1996	NONE	
WO 03098301	A	27-11-2003	AU 2003233889 A1	02-12-2003
			WO 03098301 A2	27-11-2003
US 5355429	A	11-10-1994	FR 2700021 A1	01-07-1994
			GB 2274178 A ,B	13-07-1994